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IS 1259 (1984): Vinyl coated fabrics [PCD 13: Rubber and Rubber Products]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 1259 - 1984
(Reaffirmed 2006)

Indian Standard
SPECIFICATION FOR
VINYL COATED FABRICS
(*Third Revision*)

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(Including Amendment Nos 1,2 &3)

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BUREAU OF INDIAN STANDARDS
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AMENDMENT NO. 3 OCTOBER 1997
TO
IS 1259 : 1984 SPECIFICATION FOR
VINYL COATED FABRICS

(Third Revision)

[*Page 6, Table 1, Sl No. (iii)(a) and (b), col 4*] — Substitute '65.0' for '80.0' and '80.0' for '65.0' respectively for the existing.

(*Page 11, clause 7.3.2*) — Substitute the following for the existing clause:

'7.3.2 If the specimen, taken from one metre sample length, fails in one or more tests, each such test shall be repeated twice. For this purpose, two more samples shall be taken from the same batch/lot other than those rolls from which the earlier samples had been drawn and the specimens cut from them so that duplicate tests may be conducted in respect of each failure. If all the specimens pass the duplicate tests, the lot shall be declared conforming to the specification, otherwise not.'

(PCD 13)

**AMENDMENT NO. 2 MAY 1994
TO
IS 1259 : 1984 SPECIFICATION FOR VINYL
COATED FABRICS**

(Third Revision)

(Page 5, clause 4.1, last line) — Add the following at the end:
'(dyed/scoured material in case of cotton fabrics)'.

(Page 5, clause 4.2, last line) — Add the following at the end:
'The shade of the base fabric shall be more or less similar with the shade of coated fabrics. In case of black shades, sulphur dyes shall not be used.'

(PCD 16)

AMENDMENT NO. 1 JANUARY 1988

TO

IS:1259-1984 SPECIFICATION FOR VINYL
COATED FABRICS

(Third Revision)

(Page 5, clause 4.1, Note) - Add the following new note after the existing note and renumber the existing one as NOTE 1:

'NOTE 2 - In case the material is of black shade, sulphur dyes shall not be used.'

(Page 9, clause 4.13, line 3) - Substitute 'when tested according to IS:7016(Part 5)-1973+' for 'when tested as prescribed in Appendix J'.

(Page 22, Appendix J) - Delete and renumber the subsequent appendix accordingly.

+Methods of test for coated and treated fabrics:
Part 5 Determination of coating adhesion (first
revision).

(PCDC 16)

Indian Standard
SPECIFICATION FOR
VINYL COATED FABRICS
(Third Revision)

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Indian Standard
SPECIFICATION FOR
VINYL COATED FABRICS
(*Third Revision*)

0. FOREWORD

0.1 This Indian Standard (Third Revision) was adopted by the Indian Standards Institution on 23 March 1984, after the draft finalized by the Treated Fabrics Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 Vinyl coated fabrics are manufactured by applying to one side of a woven fabric a substantially continuous coating of suitably compounded polymer of vinyl chloride or a copolymer, the major constituent of which is vinyl chloride.

0.3 This standard does not include requirements for the following types of coated fabrics:

- a) Based on non-woven materials,
- b) On which all or part of the coating is foamed,
- c) That are permeable to air, and
- d) With knitted backing.

0.4 The Committee was of the opinion that resistance to flame (see 4.10) was an important requirement and the entire material being made in the country should also pass this test. However, taking into cognizance the present stage of the industry in the country and also in view of many non-critical uses of vinyl coated fabrics, it agreed to prescribe two classes of material, namely, Class A and Class B in the standard. Flame resistance test is required to be done in the case of Class A material only. However, Class B material is not recommended for applications like in railways, transport vehicles, etc, where flame resistance of vinyl coated fabrics is important from the safety point of view. In due course, the Committee expects that with the development of the industry, the Class B material would be deleted from this Standard. Further each class shall be of six grades

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0.4.1 In addition, the following modifications have been made in this revision:

- a) Requirement of flame resistance has been modified and a new Appendix H has been added to test for flame resistance;
- b) The size of the specimens for the tests listed in 4.6.2, 4.6.4, 4.10, 4.11 and 4.12 have been prescribed; and
- c) The scheme of selection of test specimens has been revised.

0.5 The important uses of various grades of vinyl coated fabrics covered in this standard are as follows :

- a) *Grade 1 and Grade 2* — Used in heavy duty upholstery for seats and cushions, backs and facings in railways and automobiles, for home and office furniture and for larger suitcases.
- b) *Grade 3* — Used primarily in upholstery, medium size suitcases and in covering the automobile door panels, side panels, door arm rests and the like.
- c) *Grade 4* — Used as ordinary upholstery, side panelling, light travelling requisities and for applications where the material is subjected to little wear as in slip-seats, etc.
- d) *Grade 5* — Used mainly to enhance the appearance as in wall lining, automobile headlining, visors, and the like. It is also used for cheap upholstery.
- e) *Grade 6* — Used for decorative purposes of surfaces and wall coverings. It is also used for book binding.

0.6 It is recommended that for Grades 1 and 2 the base fabric shall be sateen and for Grade 3 it shall be twill/drill respectively. The recommended construction for sateen shall be 4/1 and for twill/drill 3/1 respectively.

0.7 This standard contains clauses 4.5, 4.6.3, 4.9.1 and 5.2.1 which call for an agreement between the purchaser and the supplier.

0.8 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard prescribes the requirements, methods of sampling and test for vinyl coated fabrics (leather cloth) whether plain, embossed, printed or otherwise treated on woven (grey or dyed) fabrics.

2. TERMINOLOGY

2.0 For the purpose of this standard, the definitions given in IS 2244-1972* and the following shall apply.

2.1 Printed Vinyl Coated Fabrics — Vinyl coated fabrics with a continuous or discontinuous transparent or coloured surface coating which also includes all multitone effects and lacquered surfaces

2.2 Standard Atmospheric Conditions for Testing — Unless otherwise specified, the test specimens shall be conditioned wherever required in an atmosphere with relative humidity of 65 ± 5 percent and temperature of $27 \pm 2^\circ\text{C}$ for 16 hours.

3. GRADES AND CLASSES

3.1 Grades — There shall be six grades of vinyl coated fabrics, namely Grade 1 to Grade 6 as indicated in Table 1. The recommended usage of these grades is given in 0.5

3.2 Classes — All grades of material shall be of two classes, Class A and Class B. Flame resistance test (*see* 4.10) is required to be done in Class A material only

4. REQUIREMENTS

4.1 Description — The vinyl coated fabrics shall consist of polyvinyl chloride or vinyl copolymer composition which is either calendered and then laminated or is spread on to dyed/undyed textile material.

NOTE — The attention of users is drawn to the fact that the coated fabric may be damaged if wrong methods of cleaning are used. Furniture creams, dry cleaning solvents, pastes or waxes should not be used. For cleaning, only a soft cloth dampened with soap and water or a mild detergent solution should be used. The surface should then be well rinsed with plain water and dried with a cloth

4.2 Base Fabric — The base fabric shall be made from cotton, rayon or other synthetic fibre or their blends.

4.3 Finished Material — The finished material shall comply with the requirements given in Table 1

*Glossary of terms relating to treated fabrics (*first revision*)

TABLE 1 REQUIREMENTS FOR VINYL COATED FABRICS
(Clause 4.3)

Sl No.	CHARACTERISTIC	REQUIREMENT FOR						METHOD OF TEST, REF TO IS	
		Grade 1 (3)	Grade 2 (4)	Grade 3 (5)	Grade 4 (6)	Grade 5 (7)	Grade 6 (8)		
(1)	(2)							(9)	
i)	• Usable width of finished fabric in cm, <i>M/in</i>	122	122	122	122	122	122	122 and 90	7016 (Part 1) - 1982†
ii)	• Mass of finished fabric in g/m ² , <i>M/in</i>	680	460	385	320	270	235		7016 (Part 1) - 1982†
iii)	• Breaking strength in kg/5 cm width, <i>M/in</i>								7016 (Part 2) - 1981‡
a)	Longitudinal direction	90.0	80.0	60.0	37.5	25.0	22.5		(Test machine shall be of constant rate of traverse type)
b)	Transverse direction	100.0	65.0	35.0	30.0	20.0	17.5		7016 (Part 4) - 1973§ (De-Mattia method)
iv)	Resistance to damage by flexing (number of flexing cycles in thousands), <i>M/in</i>								
a)	First stage	200	100	50	25	20	20		
b)	Second stage	300	150	100	50	40	40		

• Widths other than these would be supplied if agreed to between the purchaser and the supplier.

† Methods of test for coated and treated fabrics : Part 1 Determination of roll characteristic.

‡ Methods of test for coated and treated fabrics : Part 2 Determination of breaking strength and extension at break.

§ Methods of test for coated and treated fabrics : Part 4 Determination of resistance to damage by flexing.

|| The number of flexing cycles of the second stage includes the number of flexing cycles of the first stage.

4.4 Appearance — The material shall be of uniform surface finish and shall contain no bubbles and blisters. It shall be substantially free from pinholes, creases or streaks and shall be reasonably free from foreign matter when a test piece one metre long and having the full width of the material shall be cut and placed on a flat illuminated surface suitable for showing up defects. The edges shall be smooth and free from cuts.

4.5 Colour, Grain Embossing and Finish — The colour, grain embossing and finish of the material whether, in single colour or multicolour effects shall be as agreed between the purchaser and the supplier. The method given in Appendix A is only a recommended method for guidance.

4.6 Coating — The compound used for coating shall be made from suitably compounded vinyl chloride polymer or copolymer. It shall be pigmented to meet specified colour requirements. The surface shall be non-blooming and free from disagreeable odour. The coating shall be uniformly applied on one side of the base fabric and shall be substantially free from pinholes, cracks and other flaws. The coating shall be on one side of the base fabric. The coating shall satisfy the requirements given in 4.6.1 to 4.6.4.

NOTE — In case of sateen and twill/drill the coating shall be on the back side.

4.6.1 Resistance to Heat and Loss of Mass of Coating on Heating — The coating shall withstand an exposure of 24 hours in an air-oven at a temperature of $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ without showing signs of exudation or stickiness when tested as prescribed in Appendix B. The loss of mass shall be not greater than 4 percent.

4.6.2 Resistance to Cold — The coating shall not crack when a sample specimen about 250 mm long and about 6 mm wide is subjected to a bending test around a 6 mm diameter steel pin and exposure of one hour at $0^{\circ}\text{C} \pm 2^{\circ}\text{C}$. The steel pin and coated fabric shall be kept at $0^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for required period of one hour and the test carried out within 60 seconds of removal of the sample. Wherever practicable, the test shall be carried out in a chamber.

NOTE — The test shall be carried out with coated surface on the outside.

4.6.3 Colour Fastness to Dry and Wet Rubbing — The coating shall not stain and undyed cotton fabric of specified count when tested as prescribed in Appendix C.

NOTE — Metallic shades and printed leather cloth are not likely to withstand this test. However, when printed leather cloth is intended to be used for upholstery purposes, the number of abrading cycles shall be as agreed to between the supplier and the purchaser.

4.6.4 Colour Fastness to Light — The test pieces shall be tested for colour fastness to daylight according to Appendix D. However, in case of any dispute the test specimens shall be subjected to accelerated fading test as stipulated in Appendix E. For this test, the material shall be considered satisfactory when colour fastness rating of any test piece is not less than No. 4 of the standard pattern of plain dyed woollen fabrics as prescribed in IS : 686-1957*. Effect on printing may be observed in case of printed material.

4.7 Dimensional Change — The shrinkage of the material when tested as prescribed in Appendix F shall be not more than 3 percent in the weft or warp direction.

4.8 Resistance to Damage by Flexing — When tested by De-Mattia method, according to IS : 7016 (Part 4) - 1973†, the material shall comply with the number of flexing cycles given in Table 1. The material shall be considered to have complied with the requirements if none of the test pieces has shown signs of cracking to stage 'D' after the first stage and not more than half the test pieces have failed after the second stage of the test. For checking cracking to stage 'D', the middle one-third portion which is folded with curvature outside shall be examined according to the following method:

In case there is any doubt as to whether cracking has extended to the base fabric, bend the flexed test specimen face outwards around a glass rod 6 mm in diameter with a piece of a filter paper between the test specimen and the rod. Brush a suitable coloured fluid, such as red ink containing 2 percent of a wetting agent over the flexed surface and regard the test specimen as cracked only if the ink stains the filter paper.

4.9 Adhesion of Print (for Printed Vinyl Coated Fabrics) — When examined as prescribed in Appendix G the number of cycles to remove either the printed pattern or any area of printed material shall be greater than five (ten strokes of abrading member).

4.9.1 In case of metallic and white printing inks, adhesion of print shall be subject to agreement between the purchaser and the supplier.

4.10 Flame Resistance (For Class A only) — The fabric shall be tested for flame resistance as described in Appendix H and shall meet the following requirement.

4.10.1 The duration of flaming of the specimen tested shall not exceed 20 seconds after removal of the source of ignition.

*Methods of determination of colour fastness of textile materials to daylight.

†Methods of test for coated and treated fabrics : Part 4 Resistance to damage by flexing.

4.11 Bleeding Test — The coated surface of the finished material shall show no change in original shade or any tackiness when a sample specimen of 40 mm square is violently shaken for 10 minutes at 60°C in distilled water; washed with soap (conforming to Type 1 of IS : 285-1974*) and water. The observation shall be made on rinsed sample after drying with filter papers.

4.12 Surface Resistance to Chemicals (For Grades 1 to 4) — The coated surface of the sample shall not show deterioration in shade or any tackiness when a sample specimen of 40 mm square is subjected to 24 hours immersion at $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$ in one percent soap solution (soap conforming to Type 1 of IS : 285-1974*), one percent sodium carbonate solution and 2 percent sodium hydroxide solution and washed with soap water and water, rinsed and dried. The above test shall be done independently on three different samples, one each for each test solution.

4.13 Adhesion of Coating — The plies shall not separate more than 10 mm under load of 27.5 N (2.75 kgf) in any of the test pieces taken when tested as prescribed in Appendix J.

5. TESTS

5.1 Tests shall be conducted as prescribed in appropriate appendices and relevant Indian Standards mentioned in this standard.

5.2 Test Specimens — Test pieces shall be cut from the samples in the required number and in the appropriate manner as specified in the individual methods of test and in accordance with Appendix K.

5.2.1 In case where less than one metre sample is to be tested the number of test specimens may be reduced at the discretion of the purchaser.

6. PACKING, MARKING, NUMBER OF CUTS IN THE ROLL AND STORAGE

6.1 Packing — The material shall be securely packed in the form of a roll so as to ensure safe transportation.

6.2 The material shall be in rolls of minimum 20 m length. Short lengths of less than 20 m shall be permitted but the number of such short lengths shall not be more than 2 per roll. Further no short length shall be less than 5 m in length. In any consignment not more than 10 percent of the rolls shall contain short lengths.

6.3 Marking — The material shall be marked at the outer end of each roll with the manufacturer's name or trade-mark, if any, grade of

*Specification for laundry soaps (second revision).

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material, month and year of manufacture and length of material in metres.

6.3.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution

6.4 Storage — The rolls of vinyl coated fabrics shall be stored vertically on dry, clean, firm and level surface. The rolls shall be protected from dust, moisture, direct sunlight, corrosive and solvent fumes.

7. SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Scale of Sampling

7.1.1 Lot — In any consignment, all the rolls of vinyl coated fabrics of the same grade, colour and finish shall be grouped together and each such group shall constitute a lot.

7.1.2 The conformity of the lot to the requirements of the specification shall be ascertained for each lot separately. The number of rolls to be selected from lot shall depend on the size of the lot and shall be at random in accordance with Table 2.

TABLE 2 SCALE OF SAMPLING

LOT SIZE (1)	NO OF ROLLS TO BE SELECTED (2)
1	1
2 to 100	2
101 to 200	3
201 to 300	4
301 and above	5

7.1.3 The rolls shall be selected at random and to ensure randomness of selection, the procedure recommended in IS : 4905-1968* may be followed.

*Methods for random sampling.

7.2 Number of Tests

7.2.1 Each of the lengths obtained from a lot shall be examined for visual defects and coating and if found satisfactory, further tests as specified shall be carried out.

7.2.2 From each of the rolls selected according to 7.1.3, one metre length (measured between two weft threads) of vinyl coated fabric shall be cut, care being taken to exclude not less than 0.25 m length of fabric from either end. The test specimens necessary for the various test specified in the standard shall be cut from the lengths of vinyl coated fabric, thus obtained. Scheme of selection of test specimens from the sample length is given in Fig. 4. All the samples shall be kept out of contact from one another or any other material that may cause contamination.

7.3 Criteria for Conformity

7.3.1 The lot shall be declared as conforming to specification for various characteristics referred in 4 if for each of the characteristics the test results on all the individual specimens are found to be within limits of the specification.

7.3.2 If the specimen, taken from a one metre length, fails in one or more tests, each such tests shall be repeated twice. For this purpose two more samples shall be taken from the same roll(s), other than those from which the earlier samples had been drawn and the specimens cut from them so that duplicate tests may be conducted in respect of each failure. If all the specimens pass the duplicate tests, the lot shall be declared conforming to the specification, otherwise not.

A P P E N D I X A

(Clause 4.5)

TEST FOR COLOUR, GRAIN EMBOSSED AND FINISH (RECOMMENDED METHOD)

A-1. PROCEDURE

A-1.1 Colour comparison shall be made in good north daylight.

A-1.2 Pattern shall be of adequate size and not less than 100 cm² when checking a standard or reference pattern against roll of material, it is useful to place the pattern on top of the material undergoing examination.

A-1.3 When comparing patterns of embossed materials, particularly two coloured, it is important to place them so that the grain 'runs the same way' in each test and also to view them from different angles. Slight difference of brightness or dullness of surface can effect colour comparisons and can be equalized by moistening the surface of both.

A-1.4 Standard patterns shall be kept clean and stored in the dark.

A-1.5 Normal colour vision is essential for reliable colour comparison.

A P P E N D I X B

(Clause 4.6.1)

TEST FOR RESISTANCE TO HEAT AND LOSS OF MASS OF COATING ON HEATING

B-1. TEST SPECIMENS

B-1.1 The same three specimens of 10 cm × 10 cm used to determine mass of finished fabric as per IS : 7016 (Part 1) - 1982 shall be subjected to this test.

B-2. PROCEDURE

B-2.1 Suspend the test specimens in a hot air circulating oven for 24 hours at $100 \pm 2^\circ\text{C}$. Take out the specimens at the end of 24 hours from oven, cool at room temperature for 30 minutes and examine for any exudation or stickiness. After this examination, condition the test specimens for 24 hours at standard atmosphere and weigh the test specimens to the nearest 0.005 g. Determine the mass of coating as given under B-2.2.

B-2.2 Determination of Mass of Coating — Wet the cloth backing of each specimens with methyl ethyl ketone (or tetrahydrofuran) and where possible separate the bulk of the coating mechanically from the cloth. Immerse each stripped test specimen separately in 100 ml of methyl ethyl ketone (or tetrahydrofuran), with occasional agitation for 20 minutes at room temperature. Remove further the coating by peeling or scrapping, if necessary, taking care that no damage is done to the base fabric. Immerse the cloth together with any loose threads in 100 ml of the clean solvent with occasional agitation for 20 minutes at room temperature. Remove the stripped test specimens from solvent. Keep the specimens for 30 min at room temperature and dry for one hour at about 100°C . Condition the dried specimens in standard atmosphere for not less than 24 hours and weigh. Repeat washing with solvent, drying and conditioning in standard atmosphere till the consecutive

weighings agree within one percent. Use the final mass for calculation of the mass of coating as follows:

$$\text{Mass of coating } (M_3), \text{ g/m}^2 = 100 (M_1 - M_2)$$

where

M_3 = mass in g of the coating,

M_1 = mass in g of the specimen taken for test, and

M_2 = mass in g of the stripped specimen.

B-3. CALCULATION

B-3.1 Calculate the loss in mass on heating as follows:

$$\text{Loss in mass on heating, percent} = \frac{100 (M_1 - M_2)}{M_3}$$

where

M_1 = mass in g of the specimen taken for test,

M_2 = mass in g of the specimen after test, and

M_3 = mass in g of the coating.

APPENDIX C

(Clause 4.6.3)

TEST FOR COLOUR FASTNESS TO DRY AND WET RUBBING

C-1. APPARATUS

C-1.1 The apparatus shown in Fig. 1 shall consist of an abrading member *A* and a means of clamping the test piece over a plate glass surface *B* in such a manner that the abrading member and the test pieces are capable of relative reciprocating motion in a straight line. The amplitude of reciprocation, that is the stroke shall be 100 mm and the apparatus shall be mechanically operated or hand driven so that the rate of reciprocation shall be 15 ± 2 cycles (each of two strokes) per minute.

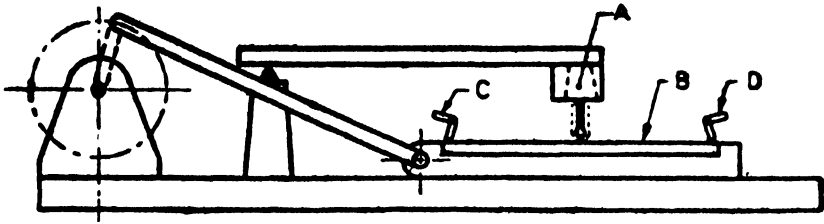
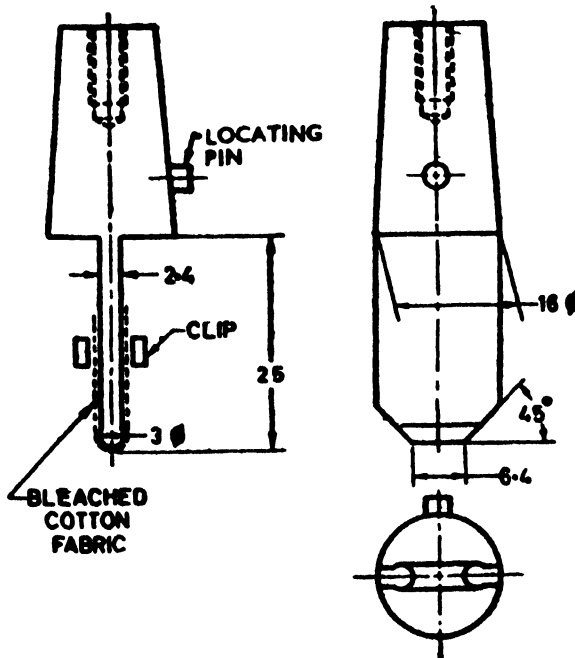


FIG. 1 APPARATUS FOR MEASURING COLOUR FASTNESS TO DRY AND WET RUBBING AND ADHESION OF PRINT

C-1.2 Abrading Member — The abrading member *A* shown in Fig. 2, shall consist of a brass peg and shall be suitably and firmly secured to the arm of the apparatus so that its centre line is at right angles to the surface of the glass plate. The arms of the apparatus shall be not less than 230 mm in length measured from the centre point of the abrading



All dimensions in millimetres.

FIG. 2 DETAILS OF ABRADING MEMBER A

member to the pivot, and shall be loaded in such a manner that the brass peg exerts a load of 5 N (0.5 kgf) on the test piece. Means shall be provided for firmly securing a strip of the specified bleached fabric around the end of the brass peg, a screw clip having been found suitable for this purpose. Suitable grips C and D shall be provided to ensure that the test piece can be secured firmly across the plate glass surface.

C-1.3 White Cotton Fabric — Bleached but not starched and in sufficient quantity for testing all the specimens. The fabric shall have an approximately 400 ends per decimetre and 250 picks per decimetre with the yarn count of 36 tex and 38 tex in warp and weft directions respectively.

C-2. TEST SPECIMENS

C-2.1 Cut from the sample at random not less than six rectangular pieces, 250 mm long and 50 mm wide, with their length parallel to the warp direction. Condition the test specimens for not less than 2 hours in the standard atmosphere and carry out the subsequent testing in that atmosphere.

C-3. PROCEDURE

C-3.1 Dry Rubbing — Cut a circle, 25 mm in diameter, from the bleached fabric (see C-1.3) and attach to the under surface of the abrading member of the apparatus, using the clip. Mount the test specimen with the coated side uppermost, over the plate glass surface such that the 'stroke' falls symmetrically within the dimensions of the test piece. Firmly secure the test piece in position by means of suitable grips, wipe with cotton-wool to remove dust and subject it to abrasion. Stop the test after 10 complete abrading cycles. Remove the fabric from the abrading member and examine the area of the fabric which has been in contact with the specimen for discoloration.

C-3.2 Wet Rubbing — Carry out the test in a similar way as under 3.1 using a circle of bleached fabric dipped in soap-soda solution containing 5 g of soap (see Type 2 of IS : 285-1974*) and 2 g of sodium carbonate (see IS : 296-1974†) in one litre of water, immediately prior to mounting on the abrading member. Subject the test piece to 10 complete abrading cycles and examine the area of the fabric which has been in contact with the specimen for discoloration.

*Specification for laundry soaps (second revision).

†Specification for sodium carbonate, anhydrous (second revision).

APPENDIX D

(Clause 4.6.4)

TEST FOR COLOUR FASTNESS TO LIGHT

D-1. APPARATUS

D-1.1 The essential features of the apparatus are a wooden box of 90×60×5 cm with a cover of window glass of 3 mm thickness. The bottom of the box shall be fitted with wire mesh of 0.315 mm thickness to allow ventilation. A removable wooden rack with batten of wood, equally spaced, is fitted to the box. The approximate width of the batten shall be 10 cm and the distance between the battens shall be 5 cm. The batten shall be equally spaced to allow ventilation in the box.

D-2. TEST SPECIMENS

D-2.1 Cut from the sample at random a test specimen 130 mm long and 15 mm to 50 mm wide.

D-3. PROCEDURE

D-3.1 Place the box in the open, facing south in the northern hemisphere. Support on legs about 75 cm high, and incline the case horizontal at 45°. There shall be no obstruction from any direction. Place the test samples in the case so that no shadows are cast during day time on the exposed samples.

D-3.2 Attach to the rack a set of wool standards of convenient size along with the test specimens and put these in the exposure case. Protect half the portions from light by covering the samples with aluminium foil or any suitable thin opaque material. Wipe out daily the cover of the glass case to remove the dust falling on it. For mounting and testing for light fastness, follow any one of two methods prescribed in IS : 686-1957*.

D-4. REPORTING

D-4.1 Observe the test specimens and the wool standards at suitable intervals till the wool standard No. 4 shows a fading (the visual contrast between the exposed and the unexposed portions) equivalent to Grade 4 on the Geometric Grey Scale. The glass lid shall be kept clean during the test.

*Method for determination of colour fastness of textile materials to daylight.

D-4.2 Remove the specimens from the box, clean with soap solution (soap conforming to Type 1 of IS : 285-1974*) and cold water. Dry and examine the test specimens indoors in good north light against a white background.

D-4.3 Compare the visual contrast between exposed and unexposed portions of the specimen with the Grade 3 on the Geometric Grey Scale. If the contrast between the exposed and the unexposed portions of the specimen is equal to or less than the contrast of the Grey Scale, the material shall be declared conforming to the requirement, otherwise not.

APPENDIX E

(Clause 4.6.4)

ACCELERATED FADING TEST

E-1. APPARATUS

E-1.1 Fadeometer

E-1.1.1 *Source of Light* — A carbon arc composed of carbon electrodes and enclosed in a heat resisting glass globe to produce a complete spectrum from 279 nm to 1 200 nm. The arc should operate on a direct current of approximately 11 to 13 A or on alternating current of 50 to 60 Hz and approximately 13 to 17 A, with 110 to 140 V across the arc.

E-1.1.2 The test specimens are vertically hung in test rack on the inner wall of a cylinder (rotating or fixed type), concentric with the arc. Distance of the test specimen shall be approximately 250 mm from the arc. No part of the specimen shall be more than 100 mm above or below the horizontal plane passing through the centre of the arc when it is fitted with new electrodes.

E-1.1.3 The air inside the chamber is humidified by placing water in a trough or water soaked cotton wicks in the chamber. A fan or blower unit keeps a flow of fresh air over the specimens and through the chamber.

E-1.1.4 A black panel thermometer placed in a rack in the chamber shall not record a temperature more than 74°C.

*Specification for laundry soaps (second revision).

IS : 1259 - 1984

E-2. TEST SPECIMENS

E-2.1 Cut from the sample a test specimens as prescribed in D-2.1.

E-3. PROCEDURE

E-3.1 Place a specimen of suitable dimensions, cut at random from any portion from the sample, along with sample No. 4 of the eight standard patterns of plain dyed woollen fabrics as prescribed in IS : 686-1957* at a distance of 250 mm from the carbon arc lamp of the fadeometer. Protect half portion of test specimen and standard dyed wool fabrics during test. Expose the face side of the samples to the radiation during test. Maintain the temperature of the circulating air at about 54°C during the test. The dyed wool standards and test specimens so mounted shall be exposed to artificial light for sufficient time to cause standard No. 4 to change colour so that the exposed portion of that standard shall have a contrast with the unexposed portion equal to Grade 4 on the Geometric Grey Scale. The dyed wool standards shall be examined often enough to ensure that the specified degree of fading of standard No. 4 is observed. After exposure the specimen shall be cleaned with soap solution (soap conforming to Type 1 of IS : 285-1974†) and cold water, dried and examined in good north light against a white background in comparison with the dyed wool standards. The colour fastness to artificial light of the material under test shall be the number of the standard wool pattern that has changed colour to the same extent as the specimen.

A P P E N D I X F

(Clause 4.7)

DETERMINATION OF DIMENSIONAL CHANGE

F-1. PROCEDURE

F-1.1 Cut a specimen 30 cm×30 cm with two sides parallel to the longitudinal direction. Draw lines parallel and perpendicular and make a square of 25 cm. Measure the distance between the marked lines to the nearest millimetre. Immerse the specimen completely under the surface of water containing a suitable wetting agent maintained at a temperature between 25 to 30°C. Use suitable means such as small weight, to keep it submerged. Leave the specimen to soak for 2 hours, then rinse it in

*Methods for determination of colour fastness of textile materials to daylight.

†Specification for laundry soaps (*second revision*).

plain water and leave it to dry on a flat surface at a temperature between 25 to 30°C. Dry the material, under standard atmospheric conditions for 24 hours and measure the distance between the lines.

F-2. CALCULATION

F-2.1 Calculate the percentage of shrinkage between each pair of datum marks by the relation:

$$\text{Shrinkage, percent} = \frac{100 (L_1 - L_2)}{L_1}$$

where

L_1 = distance between the lines before shrinkage treatment, and

L_2 = distance between the lines after shrinkage treatment.

F-2.2 Report the mean shrinkage separately for the warp and weft directions correct to within 0.1 percent.

A P P E N D I X G

(Clause 4.9)

TEST FOR ADHESION OF PRINT

G-1. APPARATUS

G-1.1 The details of the apparatus are given in C-1.1.

G-1.2 Abrading Member — The details of the apparatus are given in C-1.2.

G-1.3 White Cotton Fabric — The bleached cotton fabric shall correspond to variety No. 1 of IS : 177-1977*. Strips of bleached fabric approximately 50 mm long and 20 mm wide shall be cut with their length parallel to the warp direction.

G-2. REAGENT

G-2.1 Soap conforming to Type 1 of IS : 285-1974†.

*Specification for cotton drills (*third revision*).

†Specification for laundry soaps (*second revision*).

G-3. PREPARATION OF TEST PIECE

G-3.1 Not less than three rectangular test pieces 250×50 mm shall be cut from the sample with their lengths parallel to the longitudinal direction of the sample. The test pieces shall be cut in such a manner that each contains a portion of the printed design in such a position that it will lie in the path of the abrading member. Where the printed pattern consists of a multi-coloured design, sufficient test piece shall be prepared to enable three tests to be carried out on each colour combination or print. By suitable choice of position of test pieces, it is usually possible to have more than one print colour abraded during any particular test.

G-4. PROCEDURE

G-4.1 The test piece shall be washed with soap and water, rinsed and dried. They shall then be conditioned in the room in which the test is to be performed for at least 24 hours before testing and the temperature throughout this period shall be maintained at $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Each test piece shall be mounted in turn directly on the plate glass surface. No wrinkling of the test piece shall occur during test and it is permissible to stretch the test piece up to 20 percent in the direction of its length to avoid wrinkling. A strip of the bleached fabric shall then be secured to the brass peg. The ribbed side of the fabric shall be in contact with the peg. The peg to which the fabric has been fitted shall be lowered on to the test piece. The test piece shall then be subjected to 10 strokes of abrading member and observed for any visible damage.

A P P E N D I X H

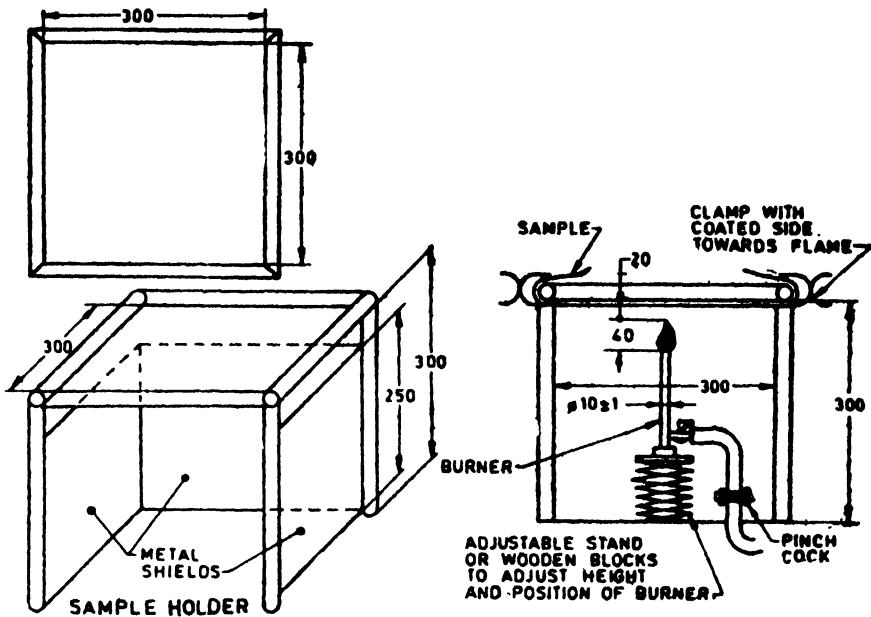
(*Clauses 0.4.1 and 4.10*)

TEST FOR FLAME RESISTANCE

H-1. APPARATUS

H-1.1 A Metal Stand — A stand shown in Fig. 3 shall have the size $300 \text{ mm} \times 300 \text{ mm}$, shielded from three sides up to 250 mm. The upper frame of the stand shall be used to fix the test specimen.

H-1.2 Bunsen Burner — Bunsen burner with 10 ± 1 mm internal diameter, with a supply of liquefied petroleum gas.



All dimensions in millimetres.

FIG. 3 APPARATUS FOR FLAME RESISTANCE TEST

H-1.3 Paper Clamps — Large paper clamps shall be suitable to hold the specimen in slight tension. (The paper clamps are similar to those used by students to clip paper on wooden board or plastic sheet).

H-1.4 Adjustable stand or wooden blocks to adjust the height of the burner.

H-1.5 Pinch cock for adjusting the height of the flame of the burner.

H-1.6 Stop watch of an accuracy 0.2 seconds.

H-2. TEST SPECIMEN

H-2.1 Cut from the sample a rectangular piece (sufficient to have enough length to be folded around the rods of the frame and clamped) of size 300 × 400 mm.

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H-3. PROCEDURE

H-3.1 Set up the apparatus in a fume cupboard, support the test specimen horizontally, with the coated side of the fabric towards the flame, by means of four paper clamps, to each on the opposite sides of the specimen in such a manner that area of 300 mm × 300 mm will be exposed to flame without sag.

H-3.2 Shut off, completely, the air supply to the burner and adjust the burner to give a luminous flame of 40 mm in length by means of the pinch cock. Place the burner in such a position that the tip of the flame is 20 mm below the centre of specimen. Apply the flame for a period of 20 seconds and then withdraw it.

H-3.3 Record separately by stop watch the time during which flaming continues.

H-3.4 The finished fabric when tested shall meet the requirement of 4.10.1.

A P P E N D I X J

(Clause 4.13)

TEST FOR ADHESION OF COATING

J-1. APPARATUS

J-1.1 The essential features of the apparatus shall be two grips capable of accommodating test pieces 50 mm wide. One of the grips shall be capable of being attached to a rigid support while the other shall be so designed that deadloads may be added as required. The loads shall be such that they conform to the requirements inclusive of the grip to which they are attached.

J-2. PREPARATION OF TEST SPECIMENS

J-2.1 Cut out at random from the sample at different places, six test pieces 80 mm wide and 130 mm long with their lengths parallel to the

direction and taking care to see that no cutting is made within 50 mm of the selvages. Coat the face of each test piece with a 10 percent solution of polyvinylchloride resin in methyl ethyl ketone (or tetrachlorofuran), and while the surfaces are still wet, ply them together face to face in pairs. In order to ensure a good contact between the coated surfaces, use a metal roller, or alternatively, place the test pieces under a heavy weight or in a letterpress for not more than 6 hours. After a period of not less than 24 hours after plying, trim the plied test pieces at each edge to width of 50 mm. Separate one fabric ply of each pair of plied test pieces from the coating over a distance of approximately 15 mm by slightly dampening the end of the test piece with methyl ethyl ketone (or tetrahydrofuran) over a distance not closer than 5 mm from the point at which the test is to be started. Keep the specimen for 30 min at room temperature. Suspend the test pieces for 15 minutes in an oven at 60 to 70°C to remove excess of solvent and then condition for not less than 2 hours in the standard atmosphere.

NOTE — Plying with organosol is necessary only, if the coating is too thin to be held without tearing, in the grip of the apparatus during the test. In cases where plying is found unnecessary, the specimen shall be straightway separated as given in last two sentences of J-2.1.

J-3. PROCEDURE

J-3.1 Mark by means of a suitable coloured crayon the line of separation of the fabric coating interface with each test piece at right angles to the longitudinal direction. Secure one ply of the test piece in the fixed grip and the other in the loose grip. Add a deadload in such a way that the combined mass of the load and grip make up to 2.75 kg. Apply the load smoothly and equally. After a period of 5 minutes, remove the load and observe the line of separation of the plies. Measure the distance from the line marked with coloured crayon over which the plies have separated to the nearest millimetre.

A P P E N D I X K

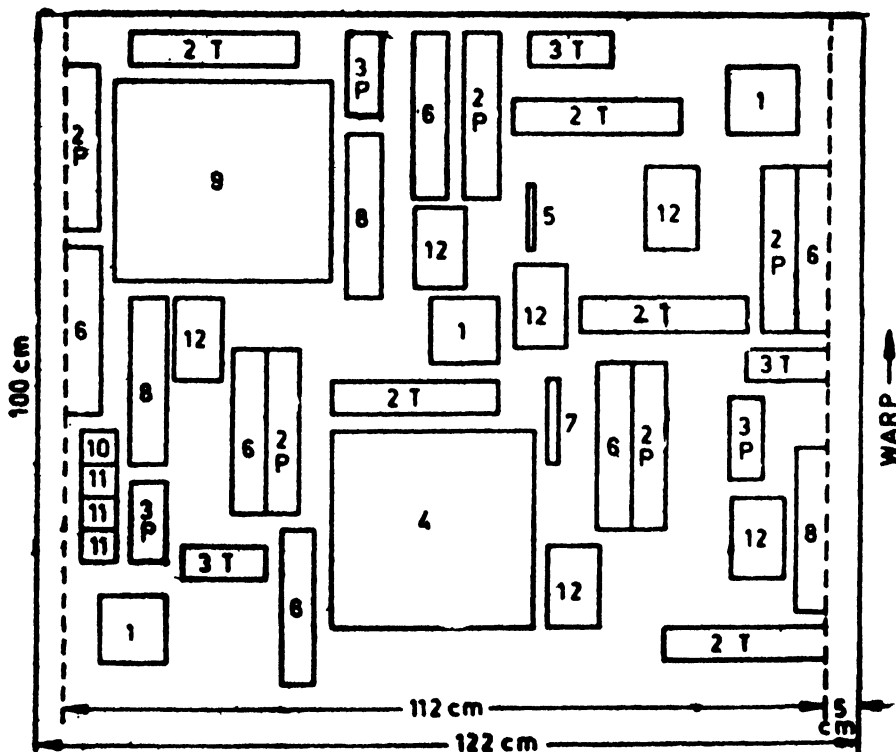
(*Clause 5.2*)

METHOD OF SELECTION OF TEST SPECIMENS

K-1. METHOD

K-1.1 The test specimens shall be selected from one metre sample of full width, when it is laid on a flat rigid surface with fabric side uppermost without any tension in either direction.

K-1.2 Draw the lines for test specimens over the sample as laid in K-1.1, in accordance with Fig. 4 which shows the positions of the specified numbers of specimens for each test.



- | | |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------|
| P - Specimen in warp direction | T - Specimen in weft direction |
| 1 - Mass of finished fabric and resistance to heat and loss of mass of coating on heating | 2 - Breaking strength |
| 3 - Resistance to damage by flexing | 4 - Dimensional change |
| 5 - Resistance to cold | 6 - Colour fastness to dry and wet rubbing |
| 7 - Colour fastness to light | 8 - Adhesion of print |
| 9 - Flame resistance | 10 - Bleeding test |
| 11 - Surface resistance to chemicals | 12 - Adhesion of coating |

FIG. 4 SCHEME FOR SELECTION OF TEST SPECIMENS (NOT TO SCALE)

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